

Superbubble of supernova remnants caught in act of forming

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A superbubble in space, caught in the act of forming, can help scientists better understand the life and death of massive stars, say researchers at the University of Illinois at Urbana-Champaign.

Found within the Small Magellanic Cloud – a galactic neighbor of the Milky Way – the large region of ionized hydrogen gas is designated "LHa115-N19," and "contains a number of massive stars and overlapping supernova remnants," said Rosa Williams, an astronomer at the U. of I. "We can tell there has been a fair amount of stellar activity going on."

From birth to death, massive stars have a tremendous impact on their surroundings. While alive, these stars generate stellar winds that push away nearby gas and dust, forming low-density cavities inside expanding bubbles. When the stars die, shock waves from their death throes can enlarge those bubbles into huge supernova remnants.

"In N19, we have not one star, but a number of massive stars blowing bubbles and we have several supernova remnants," Williams said. "Some of these cavities may overlap with one another. Eventually, these bubbles could merge into one enormous cavity, called a superbubble."

To identify the locations of massive stars, stellar-wind bubbles and supernova remnants in N19, Williams and colleagues combined optical images, X-ray data and spectroscopic measurements.

"We caught this particular region of N19 at a neat moment in time," Williams said. "The stars are just dispersed enough that their stellar winds and supernova blasts are working together, but have not yet carved out a full cavity. We are witnessing the birth of a superbubble."

The behavior of matter and energy within a superbubble has implications for the formation of planetary systems, said Williams, who will present her team's findings at the American Astronomical Society meeting in Seattle, on Tuesday (Jan. 9).

During its life and death, a massive star forges the heavy elements that enrich the interstellar medium and form planets. "Our own solar system may have formed within the confines of a superbubble," said Williams, who uses an analogy with people to help explain her interest in superbubbles.

"Some people live pretty independently in isolated country houses, while others live in large cities that require a centralized structure," Williams said. "In N19, we are looking at a possible bridge between an individual star living its life and dying its death, and a community of stars, where living and dying affects other stars and planets, and creates a structure around them."

Source: University of Illinois at Urbana-Champaign

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